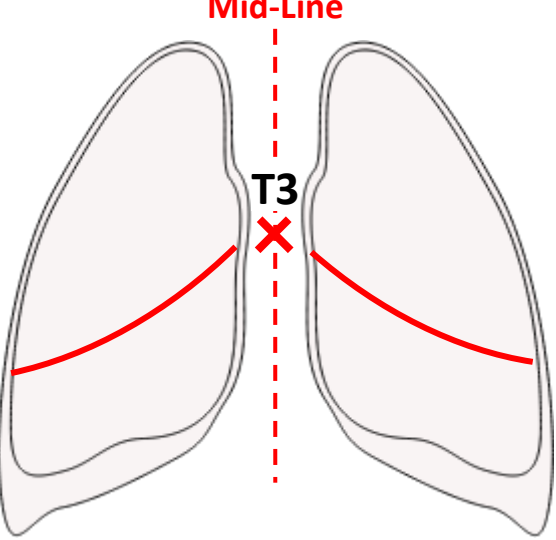
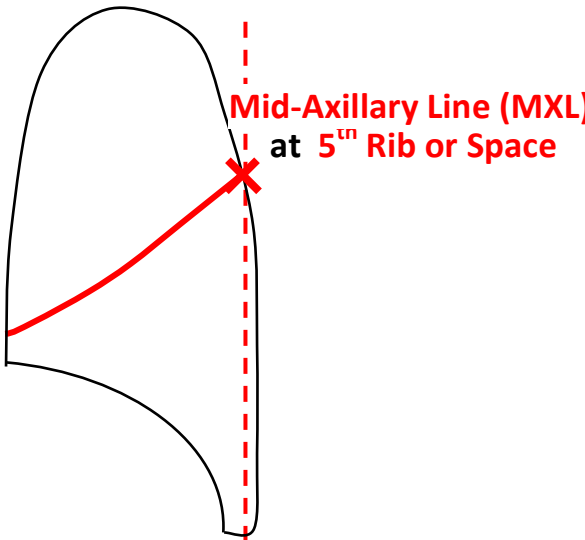
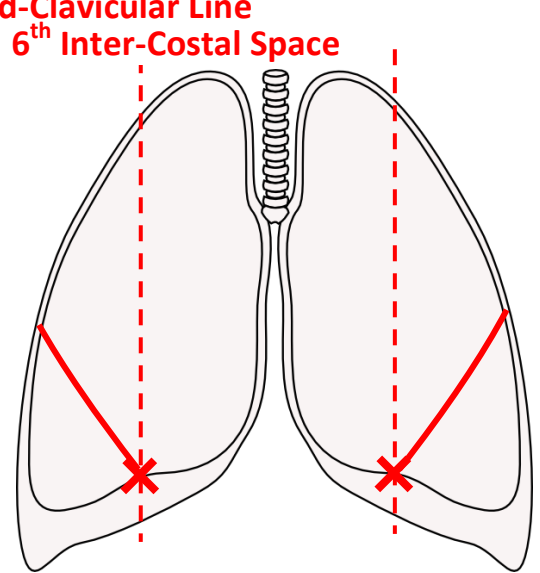
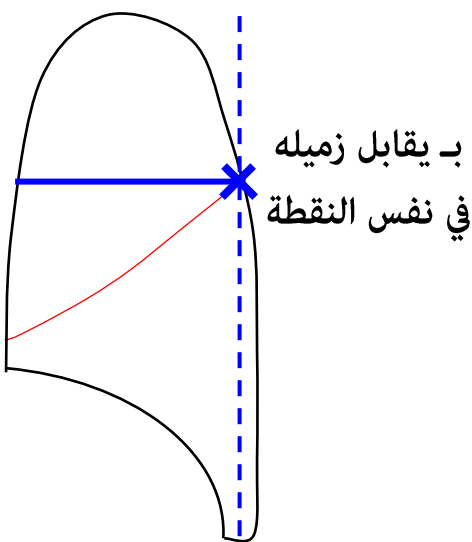
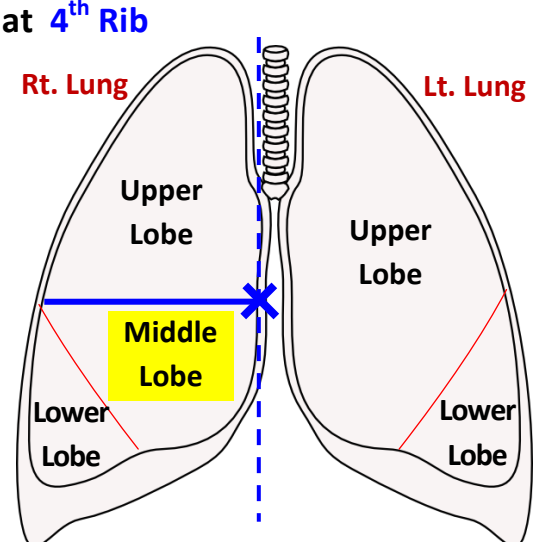


Chest Investigations & Treatment of TB

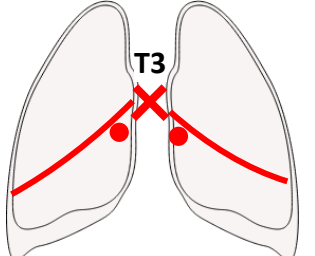
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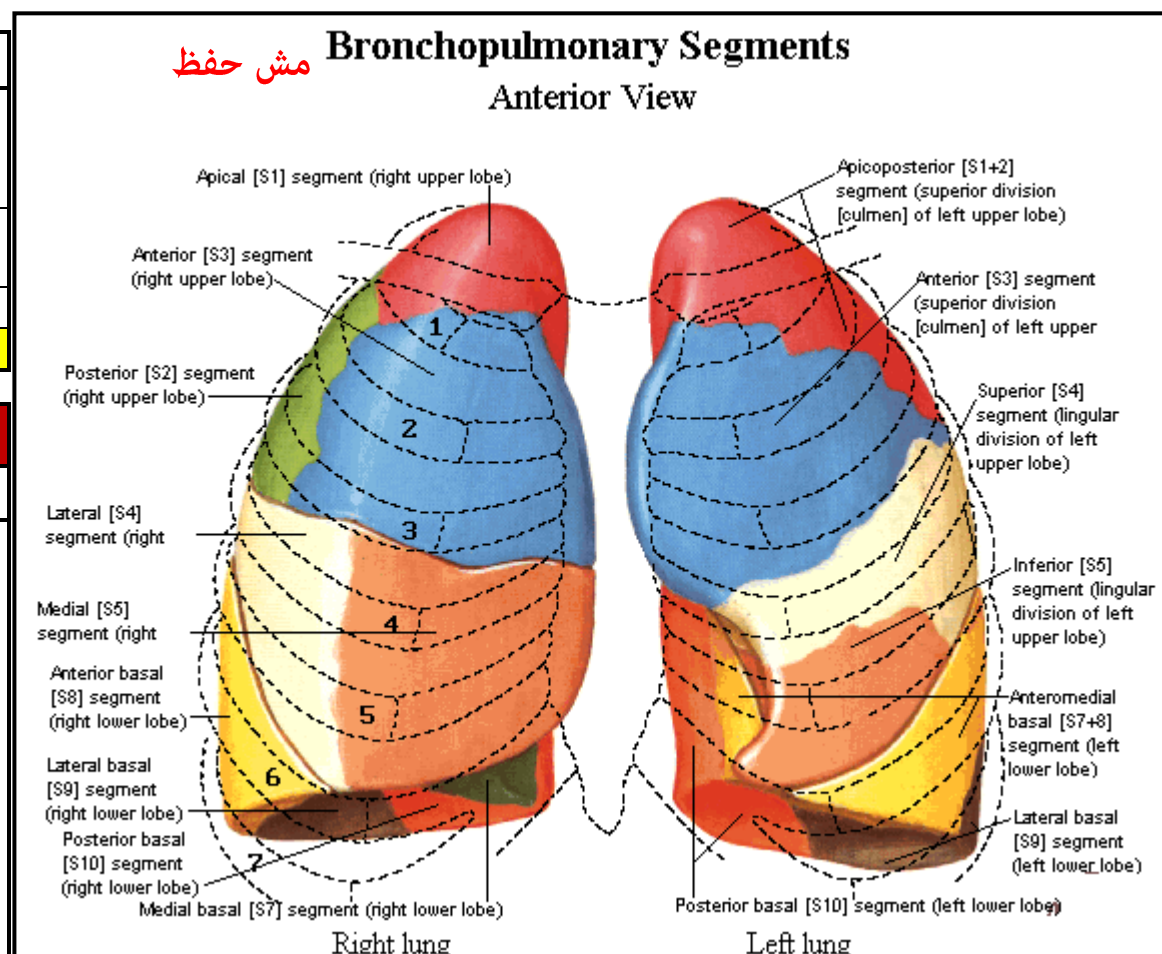
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* Surface Anatomy of the Lung (Lobes & Fissures): **هام** أشعة عملي (شفوي)

Back View	Lateral View	Front View	
 Mid-Line T3	 Mid-Axillary Line (MXL) at 5th Rib or Space	 Mid-Clavicular Line at 6th Inter-Costal Space	Greater Oblique Fissure
It's called "Greater" as it's Appear in All 3 Views			
- Mid-Line - Spinous Process of T3	- Mid-Axillary Line (MXL) 5th Rib or Inter-Costal Space	- Mid-Clavicular Line (MCL) 6th Inter-Costal Space	Surface Anatomy
The Patient Tilting his head Down - the 1 st spine appear is C7 .. then go Down	The Patient Rise his hand - the 1 st Rib to meet is 4th .. then go Down	معروفة يعني	نجيبها إزاي
	 بـ يقابل زميله في نفس النقطة	 at 4th Rib Rt. Lung Lt. Lung Upper Lobe Middle Lobe Lower Lobe	Lesser Transverse Fissure
	- Mid-Axillary Line (MXL) 5th Rib or Inter-Costal Space	- Para-Sternal Line or Mid-Line 4th Rib	On Rt. Side ONLY
			Surface Anatomy

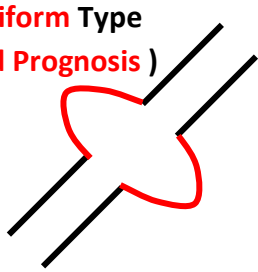
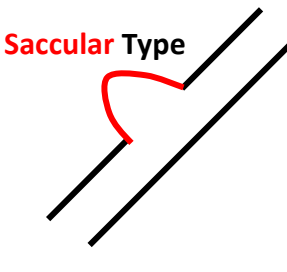
Rt. Lung	Lt. Lung
2 Fissures (Greater Oblique Fissure & Lesser Transverse Fissure)	1 Fissures (Greater Oblique Fissure Only)
3 Lobes (Upper, Middle & Lower)	2 Lobes (Upper & Lower)
10 Broncho-Pulmonary Segments	9 Broncho-Pulmonary Segments
Rt. Side > Lt. Side by 1 Always	

يتسألوا إزاي في العملي !؟	
1• Direct Qs .. What is the Surface Anatomy of Lung ?	
2• Examine the Middle Lobe ? - go to the 4th Inter-Costal Space on the RIGHT SIDE , then Move a little bit Lateral , then Listen by Stethoscope N.B. NEVER do it on THE LEFT SIDE or at the BACK	3• Examine the Apical Segment of Lower Lobe ? At the BACK - Patient will Sit Down , then Tilt his head Down , the 1 st spine appear is C7 .. then go Down to T3 then Listen by Stethoscope
	



* Chest Investigations :					for
Investigation Scheme : 1- Laboratory : - Blood - Urine & Stool - Others 2- Graph. 3- Radiological : - Plain X-ray - with Contrast - Others 4- U/S. 5- C.T. & MRI 6- Nuclear Medicine 7- Endoscopy 8- Catheter 9- Biopsy 10- Others (P.F.T.)		1 • Cor-Pulmonale : (will show Heart Failure or Rt. Vent. Enlargement)		- by H/O : History of Systemic Venous Congestion - by Examination : Rt. Sided Heart Failure Sign - by Investigation : ✗ of Heart Failure → it's a CLINIACL Diagnosis (No Investigation) ✓ of +++ Rt. Vent. Enlargement → ECG "but all investigation will show it"	
		2 • Respiratory Failure : [it's Investigation Diagnosis] * The Most Common Patient Liable to Complicate with Resp. Failure is COPD Pt. esp. Resp. Failure Type II		- it's Suggested Clinically by (Cyanosis, Flapping Tremors & Disturbed Conscious Level) - by Investigation : Arterial Blood Gases (ABG) * Arterial Sample ONLY .. for (Pressure O ₂ , Pressure CO ₂ & pH) N.B. Normal O ₂ Pressure = 100% , Normal CO ₂ Pressure = 40% # it's Resp. Failure when : 	

• Tuberculin Test			
[is a Skin Test that Detects Delayed Hypersensitivity (Type IV) Response to <u>Previous Exposure</u> of the Host to the Tubercle Bacilli] - it's one of the Main Tests used to Diagnose LATENT Tuberculosis Infection			
• Underlying Mechanism :	• as a Result of <u>Previous Exposure</u> of the host to Tubercle Bacilli → Th1 Cells are <u>Sensitized</u> , <u>Activated</u> & <u>Clonally Expanded</u> • in +ve Reactors ; the Injected Tuberculin Substance Stimulate the Pre-Sensitized Th1 Cells Th1 Cells → Secrete Cytokines ʿ Recruit Inflammatory Cells Particularly Macrophages - the Result is a Raised, Indurated Area around the Site of Injection N.B. No Reaction is seen in People who have Not been Sensitized to TB		
• Technique :	• 0.1 ml of Purified Protein Derivative (PPD) Containing 5 Tuberculin Unites (TU) is Injected Intra-Dermally in the Skin of the Anterior Aspect of the Forearm • the Result is read After 48-73 Hrs. by PALPATING for the Presence of INDURATION & Measure its Diameter (NOT the Erythema)		
• Interpretation :	Reaction have been Categorized by Different Criteria (Risk Factors) Depending on the Circumstances of the Patients		
	"5-10-15 Millimeter System"		
	5	10	15
	Indurations 5> ml.	Indurations 10> ml.	Indurations 15> ml.
	• Considered Positive for : - People who have Had TB Disease before - Close Contacts of People with Infectious TB - People with HIV Infection	• Considered Positive for : - People who in Endemic Areas where TB is Common - People with Certain Medical Conditions e.g. Diabetes - Un-vaccinated Children Younger than 4 Years Old	Considered Positive *even in Absence of Any Risk Factors
• False -ve Results :	1- Anergy: it's Inability to React to Tuberculin Test because of Weakened Immune System e.g. Severe TB Disease, HIV Infection or Cancer 2- Recent TB Infection: after exposure, it takes 2 to 10 Weeks for Tuberculin Test to become +ve		
• False +ve Results:	1- Infection with Non-Tuberculous Mycobacteria (NTM): due to Cross-Reaction with M. tuberculosis Antigens 2- Vaccination with Bacille Calmette-Gu é rin (BCG): after BCG Vaccination, Tuberculin Skin Test Remains +ve for up to 5 Years		

	± Technique		Indication تعمل لـ العيان أيه ؟!	Value هـ تبين أيه ؟!	± its Reading !؟ بيان إزاي ؟! see Para-Clinical Notes	
• Labs :						
1 • Sputum Analysis : مزرةة بلغم (it's <u>Not</u> Investigation of Choice .. but, it may be the 1 st Investigation to be done)	# Analysis Aspects		العيان الي هـ أحتاج أديله مضاد حيوي • S.L.S. ONLY • COPD “when he Infected” BUT , In 90% of Cases of COPD .. the Organism is Known so, we Start Empirical ttt With OUT Sputum Analysis # when we do a Sputum Analysis for COPD Patient ?! • if Empirical ttt Failed • if it's Associated with Broncho-Ectasis	—		
	a • Macroscopic	- Physical Properties - Chemical Analysis				
	b • Microscopic	- Cells - Organisms				
	c • Culture & Sensitivity					
	إذا الدكتور سأل ما تقولهاش من نفسك we can use Broncho-Scope to get clean Samples					
2 • Serous Aspirate Analysis : For Pleural Fluid	• via Thora-Centesis.. (we insert the Needle ABOVE the Rib to <u>Avoid Injury of the Intercostal Nerve</u>) Then, do Analysis for the Aspirated Fluid as previous mentioned in sputum analysis		• Pleural Effusion	# by X-ray we will Diagnose the Pleural Effusion .. but we do Aspiration to Categorize the Effusion (Transudation, Exudation, Chylous & Malignant) See next page		
3 • Sweat Analysis : تقولها لما الدكتور يسألك	• give the Patient “ Pilocarpine ” to make him Sweat		• Cystic Fibrosis .. as it present as S.L.S.	—		
• Radiological :						
4 • Plain X-ray :	مؤجل		• All Chest Cases	For each Disease there's a Certain Pattern • in Pleural Effusion it's the Invest. Of Choice - in Postero-Anterior View & - in Lateral View for <u>Minimal</u> Effusion		
5 • Contrast ^{هام*} (Broncho-Graphy) : N.B. ب ينزل في اللجئة ك أشعة	# المادة ما هي ؟!		• S.L.S. especially Broncho-Ectasis - It was the Investigation of Choice <u>until</u> the C.T. has been Discovered	• Confirm the Diagnosis .. as X-ray could Miss the Diagnosis • Determine the Type of Broncho-Ectasis .. Fusiform Type (Bad Prognosis)  Saccular Type  • Determine the Site (و Segment) العلاج ب يحدد		
	✖ Lipidol (contain Iodine)	✓ Hytrast (و Now Used)				
	• Iodine Sensitivity • Fat Soluble → Fat Embolism	• Free of Iodine • Water Soluble				
	# ما هي طريقة إدخالها ؟!					
	via Broncho-Scope .. with Anesthesia					
	# أيه هي مشاكلها ؟!					
	1- Iodine Allergy 2- Anesthesia Complication	3- Fat Embolism 4- Spread of Infection in Acute Attack				
6 • C.T. :	مؤجل		• S.L.S. for both (Abscess & Broncho-Ectasis) * but for Broncho-Ectasis as the lesion is too Small, we use <u>High Resolution C.T. (HRCT)</u> with Minimal Thickness Cut (but it's <u>Much More Expensive</u>) • Interstitial Pulmonary Fibrosis	—		
7 • Endoscope = Broncho-Scope : ^{هام جداً شفوي*} “there are 2 Types : Rigid & Fibro-Optic (Flexible) ”	# What is the Indication for Broncho-Scope ?! شفوي		• S.L.S. especially Lung Abscess	# What are the Value in Lung Abscess ?! • to Visualize the Lesion • to Take a Biopsy (as 50% are Malignant) • to Remove F.B. (it's usually the Cause of Abscess)		
	Diagnostic	1• to Visualize the Lesion 2• to Take a Biopsy				From Lesions in Endothelium Lining Bronchi [Endo-Bronchial] e.g. Bronchogenic Carcinoma
		± <u>Broncho ALVEOLAR Lavage (BAL)</u> via Injection of Saline a wash the Alveoli .. the aspirate the wash and Analysis it				
	Therapeutic	1• Removal of F.B. or Mucus Plug 2• to Insert Medications : Antibiotics or Cyto-Toxic Drugs ± <u>to Stop Severe Hemoptysis</u>				
8 • P.F.T.	See next page					

Pulmonary Function Tests (P.F.T.) مهم جداً جداً	
Spirometer مقياس التنفس	
• the Results will be express as a Graph (Spiro-Graph)	
1- Ventilation : the Air Enter the Lung Almost the Disease affect this Function → ↓ (Hypo-Ventilation) .. either • Obstructive الدُّنيا مسدودة e.g. COPD • Restrictive مش قادر أفتح e.g. Fibrosis & Effusion	1 • Forced Vital Capacity (FVC) [Volume of Air Expired by Max. Expiration following Max. Inspiration]
2- Diffusion : the Air Enter the Alveoli	2 • Forced Expiratory Volume in 1st Second (FEV₁) .. it Depends on Diameter of Airway (as Diameter ↑ → ↑ FEV ₁) [Volume of Air that has been Exhaled at the End of the 1 st sec. of Forced Expiration]
3- Perfusion : the Air exchange with Blood	3 • Forced Expiratory Ratio (FER) = FEV₁/FVC ... * in COPD , FER will ↓
* Indications :	
• COPD , Fibrosis	
* Value :	
• to Know the Nature of Lesion (Obstructive, Restrictive or Mixed)	
• to Know the Degree of Lesion via % of FER (Prognostic Value)	
• to Determine the Reversibility of Lesion (e.g. in case of Broncho-Spasm .. do the test (FEV ₁) .. then give the Patient Broncho-Dilator .. then Repeat the test (FEV ₁) if it's Improved → it's Reversible Lesion)	
N.B. we have to Determine the Reversibility of Lesion as we will Treat the Patient with a Drug for Life which has also a Side Effect .. so we need to Know if this Drug is Beneficial or Not	
Peak Expiratory Flow Rate (PEFR) أسم الإختبار	
Peak Flow Meter أسم الجهاز	
	Flow Meter بـ يقيس معدل خروج الهواء في وحدة الزمن
	Peak لـ أنه الجهاز لما العيان ينفخ فيه المؤشر هـ يعلى لـ مستوى معين .. بس لما العيان يشيل بوقه من الجهاز .. المؤشر هـ يفضل مكانه في أعلى نقطة وصلها (إلا إذا العيان داس على زرار في الجهاز ورجعه لـ الصفر)
.. it Depends on Diameter of Airway (as Diameter ↑ → ↑ PEFR) .. & as the +++ PEFR .. this mean that the Patient Condition is Improve	
* Technique :	
• 1 st patient should take a 3 repetitive Respirations .. then he Expired the Air	
★ N.B. NOW .. the New Classification of Bronchial Asthma is Depend on (PEFR)	
	
	
Match Test “very Famous but Not Accurate” الكبريت	
بـ تشوف العيان يقدر يطفي عود الكبريت من على بُعد كام سم .. * بس خلي بالك : العيان لازم يكون فاتح بوقه جامد .. عشان ما يستخدمش عضلات بوقه في النفخ .. إحنا عايزين الهواء اللي خارج من الرئة بس * if Patient Can NOT Snuff Out the Match from a Distance < 15 Cm. .. this = OBSTRUCTION	
Forced Expiratory Time (FET) “very Accurate”	
بـ نخلي العيان يطلع نفس جامد & the Doctor put the Stethoscope on the Trachea by Stopwatch : Determine the Time for Expiration (as the Time +++ > 5 Sec. .. this = OBSTRUCTION) N.B. the Results of this Test is Comparable to the Results of Spirometer 🏠 (يعني) المنظر كدام الدكتور وكدزه	

Categorize the Effusion				
Transudation		Exudation	Chylous	Malignant Effusion
< 3 gm %	Protein	> 3 gm %	• Milky White	• Hemorrhagic, Massive, Rapidly Re-Accumulating After Aspiration
< 1016	Sp. Gravity	> 1016	• Contains Many Fat	• Contains Malignant Cells
< 200 IU/L	LDH	> 200 IU/L	• Clear on Addition of Ether	• The Mediastinum may be Shifted to Same Side of Effusion due to Underlying Lung Collapse
< 1000 /ccm	Cells (WBCs)	> 1000 /ccm	• Stain Orange with Sudan III	

Tuberculosis (TB) “it’s a MICROBIOLOGY Disease” مهم جداً جداً عملي وشفوي** وتحريري				
N.B. TB is Included in Almost All Chest Cases		• Pleural Effusion as TB is the Commonest Cause • Pulmonary Fibrosis as TB is the Only Cause • Lung Abscess as TB is Producing Cavities in the Chest • Broncho-Ectasis as TB is Producing a Weakness in the Wall of Bronchi		ف في اللجنة لما ينزل العيان .. ب يبقى نص اللجنة ع المرض الموجود .. والنص الثاني على الـ TB
* <u>Diagnosis :</u>				
For Suspecting TB	1 • X-ray			
	2 • Tuberculin Test discussed before			
For Confirmation of TB	3 • via Finding TB Bacilli in Samples			
	• What is the Possible Samples ?!? - لازم Sputum If Patient could Not Cough, The Doctor will Encourage him to Cough by Fluid Medication even in Children (they Swallow their Sputum) so, we Take the Sputum Sample via Gastric Aspiration N.B. we Take a 3 Sample .. in Different Times - Pleural Aspiration ± Pleural Biopsy		• What do we do for Samples ?!? A - Staining (Ziehl–Neelsen stain) It’s a Specific Test but Not Sensitive = if it’s +ve ʁ mean there’s Acid Fast (Resistant) Bacilli in Sample → Patient is Infected & you Have to Tell him (هتقوله العينة طلعت إيجابي) <u>but</u> if it’s -ve .. you still Suspect B - Culture & Sensitivity (Löwenstein–Jensen (L J) medium) It take More than 4 Weeks * nowadays we use (Bactec medium) to Shorten the Time	
	We Need to be SURE about the Diagnosis .. because upon this we will Decide a Management Plan with a Long Period Drugs ʁ have a lot of Side Effects			
	For Follow-up	4 • Clinically .. (الأعراض تتحسن (ترجعله شهيته لـ الأكل .. ووزنه يزيد .. ويبطل يعرق)		
5 • Radiological .. the Lesion will get Small				
6 • ✓✓✓ MicroBiology ..				
• -ve Sputum Sample (After 2 Months from Starting of Treatment) But .. Patient is Non-Infectious After 2 Weeks Only (as the Infectivity needs a Certain Number of Organism ʁ Decline after Starting of ttt) <u>Q: After 2 Months of Treatment .. the Sample Still +ve ! what is your Explanation ?!</u> - Faulty Treatment - it’s Resistant Strain				
* <u>Treatment :</u>				
Stage 1	• Sanatorium مُستشفيات الصدر		It’s OBSOLETE nowadays	
Stage 2	• Surgeries			
Stage 3	• Medical Treatment			
Drugs (Anti-Tuberculous Drugs)				
Line 1 st # مطلوب فيهم كل حاجة .. = All of these Drugs I can Start the Treatment with it			Line 2 nd # مطلوب فيهم الأسم فقط .. ما عدا واحد = these Drugs have Many Side Effects	
Drug	Dose		Side Effects	N.B. Para-Amino-Salicylic Acid (PASA) أبو قُرطاس Previously it was Considered a 1 st Line Drug .. but after Discovering that it’s “ Bacterio-Static ” it turns to be 2 nd Line Drug معنى كده إن العيانيين إذا كانوا أخذوا الدواء من زمان .. ف هـ يكونوا أخذوا الدواء ده .. وجرة الدواء ده كانت 20 جرام كل يوم .. والقرص الواحد = نص جرام .. ف كانوا بـ يدوا العيان قرطاس في الأقراص ويقول له (قر قز) 🍷 ف العيان يجيلك الشبيت يقولك وكنت بـ أخذ أبو قرطاس .. ف لازم تبقى عارفه
Isoniazid (INH)	5 mg/kg/day	Orally	- Hepato-Toxicity (CAH) - Peripheral Neuropathy mainly Sensory - Psychosis & Epilepsy - Lupus-Like Manifestations	
Rifampicin	10 mg/kg/day	Orally	- Hepato-Toxicity - GIT Irritation - Red Colored Urine	
Streptomycin	15 mg/kg/day	I.M.	- Nephro-Toxicity - Vertigo , Deafness - Ataxia , Nystagmus	
Ethambutol	25 mg/kg/day	Orally	- Optic Neuritis	
Pyrazinamide	30 mg/kg/day	Orally	- Hepato-Toxicity - Hyper-Uricemia	
Regimen				
1# Long Duration			2# Multiple Drugs	
• To Prevent Relapse as TB Bacilli could Stay alive Inside Microphage & After Death of Microphage the TB will Release .. Causing a Relapse			1 • To Prevent Resistance Development 2 • Synergism 3 • To ↓ Doses → ↓ Side Effects 4 • To ↓ Duration of ttt	
	Initiation ttt		Continuation ttt	
	• in the 1 st 2 Months • Not Less than 3 Drugs		• in the Rest of Treatment Time • 2 Drugs Only	
• Standard Regimen (9M) ده أتلغى	2 Months 1• Rifampicin 2• Isoniazid (INH) 3• Streptomycin or Ethambutol		7 Months 1• Rifampicin 2• Isoniazid (INH)	
• Short Regimen (6M) This now is the Standard	2 Months 1• Rifampicin زودت دواء واحد .. وقللت 3 شهور 2• Isoniazid (INH) 3• Streptomycin or Ethambutol 4• Pyrazinamide “it Kill TB Intracellular (Macrophage)”		4 Months 1• Rifampicin 2• Isoniazid (INH)	
• Long Regimen (9 or 12M)	# It Indicated in : • Extra-Pulmonary TB (TB Meningitis, Bone,) • Immuno-Compromised Patients			

N.B. Nowadays, TB is HOME Treatment Only زمان كان في المُستشفيات		
Indication of Administration into Hospitals are :	1• Severe Pulmonary TB 2• Immuno-Compromised Patients 3• Resistant Cases	
طريقة إعطاء الدواء	• Non-Supervision Therapy (NST)	ب ندي العيان الدواء كل شهر .. وهو ياخده لوحده من غير ما حد يشرف عليه عيبه : أنه ممكن العيان ينسى ياخذ الدواء .. أو يبيع الدواء
	• Direct Observation Therapy (DOT)	في واحد ب يروح لـ العيان كل يوم يديله الدواء ويتأكد أنه أخذ الدواء عيبه : أنه لازم تُوفر موظف يعدي ع العيان كل يوم يديله الدواء
جُرعات الدواء	• Continuous Daily Dose	يومياً
	• Intermittent Weekly Dose	مرتين في الأسبوع (ب تجيب نفس النتائج + أسهل)
* Multi-Drug Resistant TB (MDR-TB) :		
• Definition :	[it's a TB ʁ Resistant to Both Rifampicin & INH]	
• Types :	• 1ry : from the Start the Patient is Infected with a Resistant Strain	
	• 2ry : Patient is Infected with Normal Strain .. but it Develop a Resistant with time	
• Risk Factors :	• Faulty Treatment e.g. the doctor start ttt with Only 1 Drug <u>or</u> Patient did not take the drugs • Doctors & Medical Students	
• Diagnosis :	• ✓✓ via Culture & Sensitivity : ده الصح	
	• في مصر مش ب نعمل كده .. مع الأسف ب نبدأ العلاج ع طول .. وإذا العيان ما أستجابش ليه بعد شهور .. ب نشخص !	
• Treatment :	- 24 Months Continuous - Pyrazinamide + Quinolones "ده اللي عليه خلاف في الأبحاث :)"	(N.B. absolutely we will not giving Rifampicin & INH)

N.B. nowadays .. there's a New term called **Extreme-Drug Resistant TB (XDR-TB)** [it's a TB ʁ Resistant to All Drugs]

